

produces any effect, serum containing plenty of paraglobulin and ferment but only traces of the new substance.

But the injection of a solution of this body prevents the coagulation of the shed blood. Occasionally as the result of the injection very small thrombi are formed; possibly if more could be obtained considerable intravascular clotting might be set up.

The following is an example.

A quantity of the new substance obtained from 300 c.c. sheep's serum and well washed was dissolved in dilute alkali and salt solution. (The amount of substance was I estimate 0.2 gram.) This solution was injected into the jugular vein of a rabbit. The blood of this rabbit previous to the injection clotted in two minutes; after the injection the blood drawn off remained quite fluid for three hours—time of observation. It clotted, however, directly on adding some of the solution injected.

The injection of considerable quantities of serum or of paraglobulin I have not found to have any appreciable effect.

Of itself this substance, since it exists in so small amount, is of little interest, but as it appears to vary in quantity in different animals and under different circumstances, it is easy to see that misapprehensions as to the influence of paraglobulin on coagulation might easily arise.

These observations also throw great doubt on the power of fibrin ferment to produce a so-called intoxication.

This substance has an extremely feeble influence on dilute  $\text{MgSO}_4$  plasma, and hence contains but a trace of fibrin ferment. Since it is closely related to the fibrin-yielding matters of the plasma, and to the tissue fibrinogens I have elsewhere described, I should propose to call it serum fibrinogen.

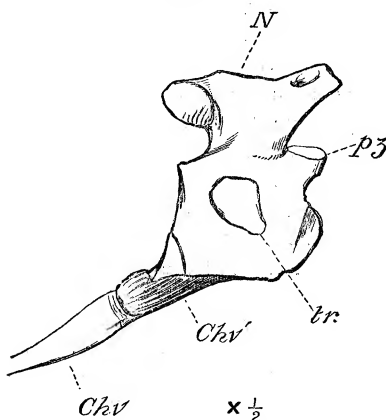
V. "Preliminary Note on the Fossil Remains of a Chelonian Reptile, *Ceratochelys sthenurus*, from Lord Howe's Island, Australia." By THOMAS H. HUXLEY, F.R.S. Received March 24, 1887.

The interesting remains of which I propose to give a brief notice in the present communication, are contained in a friable sandstone (apparently formed of concreted blown sand), and they have a very recent appearance. The age of the deposit in which they are found is unknown, but it is probably quaternary. The specimens have been for some years in the palæontological collection of the British Museum; and, for the most part, they have not yet been submitted to careful examination. But I learn that the greater number of them

were long since rightly determined to be Chelonian by Mr. Davis, and set aside as such.

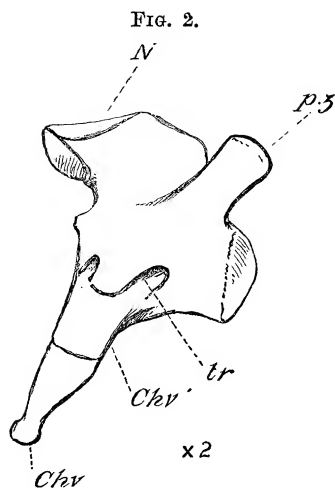
Several of the most important of these numerous and, in general, very fragmentary bones were originally found imbedded close together in the same block of sandstone. They consist of a great part of a pelvis, a caudal vertebra, and an imperfect skull. Of the pelvis, a right ischium and a pubis are imbedded in the rock, while an imperfect right ilium, which fits well on to the ischium, is separate; all these bones are unmistakably Chelonian. The caudal vertebra has remarkable peculiarities. It resembles an ordinary Chelonian caudal vertebra from the anterior half of the tail, in its general characters; but it is strongly opisthocœlous, the centrum having a deep cup behind and a correspondingly curved articular head in front. From the posterior part of the ventral face, two stout processes diverge, and present terminal rounded facets for the rami of the large chevron bone which must have articulated with them. As a general rule, the caudal vertebræ of Chelonians are procœlous—but *Chelydra* and *Gypochelys* (perhaps also *Staurotypus* and *Platysternum*) form well known exceptions,\* in so far as the vertebræ behind the 3rd or 4th are strongly opisthocœlous. In fact, the vertebra in question closely resembles the 6th or 7th of *Chelydra* or of *Gypochelys* (see figs. 1 and 2). In the first, however, the transverse processes are

FIG. 1.



Caudal vertebra of *Ceratochelys*. *N*, platform on the neural arch; *pz*, prezygapophysis mutilated; *tr*, broken transverse process; *Chv'*, processes for the chevron bone; *Chv*, chevron bone.

\* The opisthocœlous character of most of the caudal vertebræ of *Chelydra* was first pointed out by Von Meyer in his description of the Eningen *Chelydræ*. Baur ("Osteologische Notizen," 'Zool. Anzeiger,' No. 238, 1886) has gone fully into the



Caudal vertebra of *Chelydra*. Letters as in fig. 1.

very much stronger and the pentagonal platform into which the upper surface of the neural arch expands, in place of a neural spine, is as long as the vertebra instead of being only about half as long. The stout pre-zygapophysis of the right side is broken off, leaving only the base visible in the fossil.

Two other caudal vertebræ, having the same structural features, occur among the detached remains; and belong, like the first, to the second fourth of the tail. Another tolerably complete vertebra, with a considerably longer centrum, corresponds very closely with a caudal vertebra of *Gypochelys* from the third fourth of the tail. In this, as in one of the foregoing vertebræ, the chevron bones are ankylosed with the centrum. I conceive, then, that there can be no doubt that the pelvic bones and these caudal vertebræ belonged to a Chelydroid Chelonian, of about the size of the largest "Snapping turtles" which are met with in North America at the present day.

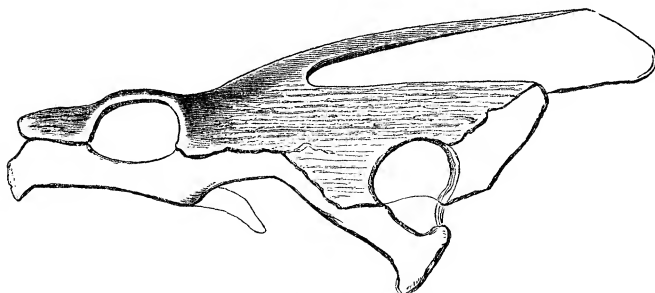
question, and has pointed out the exceptional nature of their structure among the Chelonia. Since the above paragraph was written, Dr. Günther has kindly enabled me to examine a spirit specimen and a skeleton of *Platysternum*. The caudal vertebræ resemble those of *Chelydra*, except that the last nine are proœlous, while that between these and the more anterior opisthocœlous vertebræ is nearly flat at the ends. In this, as in other respects, *Platysternum* presents characters intermediate between *Chelydra* and the ordinary *Emyda*. Professor Cope ('Vertebrata of the Tertiary Formations of the West,' 1883, p. 111) ascribes opisthocœlous caudal vertebræ to the *Baenida*, but no figures or descriptions of such vertebræ are given. Of the opisthocœlous Chelonian vertebræ figured in Plate XXIV of the 'Report of Extinct Vertebrata obtained in New Mexico' (1877) it is expressly stated that their "correct reference cannot now be made" (p. 43).

*Prima facie*, the skull found in the same block might also be expected to be that of a Chelydroid; and, in fact, it is so. I do not base this interpretation on the Chelonian character of the upper jaw, as there are various extinct Saurian reptiles which closely approximate Chelonia in this part of their structure. The diagnostic characters lie in the back part of the skull; and especially in the auditory region, which is altogether Chelonian. Not only so, but when this fragmentary skull is compared with that of *Chelydra*, the correspondence between the two is singularly exact (figs. 3 and 4). In two respects, however, the fossil differs from *Chelydra* and *Gypochelys*.

FIG. 3.



FIG. 4.



Skulls of *Ceratochelys* (fig. 3) and *Chelydra* (fig. 4); the latter of the natural size, the former much reduced. The portion of the skull of *Chelydra* which corresponds with the fossil is shaded.

1. The roof over the temporal fossa formed by the parietal, post-frontal, and other bones, which leaves the auditory region uncovered in the recent genera,\* extends back, beyond the occiput, in the fossil, and sends down a broad vertical rim from its margin.

\* The 'roof' extends much further back in *Platysternum*.

2. The upper surface of the cranial shield is, at most, rugose in the recent *Chelydridæ*; in the fossil, three strong conical processes, like horn-cores, of which the middle is the longest, are developed from its posterior and lateral region.\*

This skull is described and figured in the 'Philosophical Transactions' for 1886 (Plate 30, fig. 1) by Sir R. Owen, under the generic or subgeneric name of *Meiolania*, and is said to belong to a Saurian reptile closely allied to the "*Megalanian prisca*" described in earlier communications. But the skull is assuredly that of the Chelydroid Chelonian to which the pelvis and caudal vertebra belong; What *Megalanian prisca* may be I do not pretend to say; but the remains which I have described can have nothing to do with any Saurian reptiles; and I propose to confer on the genus of Chelonian to which they belong the name of *Ceratochelys*.

The singular osseous caudal sheaths described by Sir R. Owen, in the same memoir, also appertain to *Ceratochelys*. They formed part of the series of remains sent to the British Museum along with the foregoing, in which none but Chelonian bones have yet been discovered; and the remains of vertebræ left in these sheaths are similar to the caudal vertebræ of the terminal fourth of the tail in the *Chelydridæ*. The Snapping turtles are noted for the length and strength of the tail and for the strong, laterally compressed, acuminate "scales" which form a crest along the median dorsal line, while others, less strongly keeled, lie at the sides of the tail. In many Chelonian, the extremity of the tail is enveloped in a continuous sheath. These and other scale-like structures in the Chelonian, are usually spoken of as if they were entirely epidermal. But, a day or two ago, Dr. Günther informed me that in the Australian Tortoise, *Manouria*, the great imbricated scales of the limbs contain bony scutes; and that similar scutes are to be found in *Testudo græca*. This of course, suggested the examination of the caudal scales of *Chelydra* and *Gypochelys*; and, having been enabled by Dr. Günther's kindness to examine the caudal scales of a good sized specimen of the latter, I have found that those of the crest contain bony scutes.† The bony scute corresponds very closely in form with the whole "scale," but the recurved apex of the latter is formed only by epidermal substance (figs. 5 and 6).

The living *Chelydra*, therefore, has a caudal armature which, in

\* It is possible that these may be dermal bones coherent with the proper cranial shield.

† The fact is noted by Rüttimeyer (Lang and Rüttimeyer, "Die Fossilen Schildkröten von Solothurn," 'Denkschriften der Allg. Schweiz. Gesellschaft,' vol. 22). The armature of the tail in *Platysternum* is for the most part arranged in zones, of four plates in each zone; but I have not yet been able to find any bone in them.

FIG. 5.

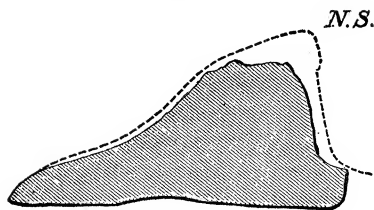
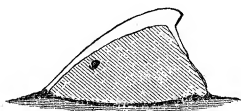


FIG. 6.



Sectional views of a scute of the tail-armour of *Ceratochelys* (fig. 5), and of one of the crest plates of *Gypochelys*, both of the natural size.

principle, is similar to that of *Ceratochelys*, but the osseous elements are relatively atrophied. There is exactly the same relation between the armour of species of living *Crocodiles* and *Alligators*, on the one hand, and those of *Jacare* and *Caiman* and the extinct *Teleosauria*, on the other. In the former, the epidermal scales remain well developed on the ventral side of the body, while the corresponding osseous scutes, fully developed in *Jacare*, *Caiman*, and *Teleosauria*, have vanished.

Among the detached fragments to which I have referred, there are remains of ribs, with their costal plates; marginal and other plates of the carapace; parts of the plastron; part of a scapula; sundry limb bones; and several of the cranial processes called "horn-cores." They all agree, so far as they can be compared, with the determination already arrived at; which, to sum it up in a few words, is that the remains of crania and caudal sheaths from Australia, hitherto referred to Saurian reptiles, under the names of *Megalania* and *Meiolania*, appertain to a hitherto unknown species of Chelonian, *Ceratochelys sthenurus*, closely allied to the living *Chelydra*, *Gypochelys*, and *Platysternum*.

The evidence of this fact offered in the present note appears to me to be conclusive, but it may be desirable hereafter to figure the parts mentioned and to describe them at length.

The interest which attaches to the discovery of this singular Chelonian arises partly from the fact, that the group of Chelonian to which it belongs is wholly unrepresented in the fauna of Australia, as at present known. *Platysternum* is usually said to be found in China. Dr. Günther, however, informs me that Upper Burmah is its proper

habitat; otherwise, North America, east of the Rocky Mountains, is the nearest region in which the *Chelydridæ* are to be found. But *Chelydridæ*, and, indeed, species of the genus *Chelydra*, occur in Upper Miocene (Eningen) and in Eocene formations in Europe. Moreover, *Platycheilus*, of the Upper Jurassic series of Bavaria and Switzerland is regarded by Rüttimeyer as an early form of the group.

Lord Howe's Island is about 200 miles from the nearest Australian mainland, and something like 400 miles, as the crow flies, from the Darling Downs, in which the caudal armour, which has been ascribed to *Megalanina*, was found. The discovery of *Ceratocheilus*, therefore, has an interesting bearing on the question of the former extension of Australia to the eastward, on the one hand; and of the possible derivation of such forms as *Ceratocheilus* from Asia, on the other hand. An elevation of the sea bottom of 6000 feet would place Norfolk Island and Lord Howe's Island on a peninsula extending from the region of the present Barrier Reef to New Zealand; and the Floræ and Faunæ of those islands are known to have special affinities with those of New Zealand and none with those of Australia.

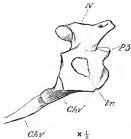
Speculations respecting the origin of the Chelonian carapace, are suggested by the discovery of osseous scutes in the vertebral region of the tail, and their coalescence in *Ceratocheilus* to form a sort of caudal carapace, ridged in a manner resembling that of *Chelydra* and *Platycheilus*. But the consideration of these points would take me beyond the limits of the present note.

## VI. "Action of Caffein and Theine upon Voluntary Muscle."

By T. LAUDER BRUNTON, M.D., F.R.S., and J. THEODORE CASH, M.D. Received March 24, 1887.

From a number of experiments we have found that caffein and theine both cause rigor in the voluntary muscles of frogs. All these experiments were made on *Rana temporaria* and none on *Rana esculenta*. The action is, however, very variable, the rigor being sometimes exceedingly well marked, and at other times not observable. The alteration does not depend on the dose of the alkaloid. When the gastrocnemii of the same frog were treated with solutions of caffein or theine of different strengths, the stronger solution had the most powerful action; but when different frogs were used, a large dose sometimes had little action on one frog, while a small dose had a powerful action on another. Theine seems to be rather more powerful than caffein, but the quantitative difference between them is slight. There is, however, a marked qualitative difference between them, inasmuch as theine tends to produce rhythmical contractions in the muscle. Complete curarisation quickens the occurrence of rigor. A

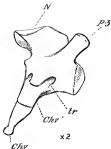
FIG. 1.



Caudal vertebra of *Ceratolepis*. *N*, platform on the neural arch; *pz*, prezygapophysis mutilated; *tr*, broken transverse process; *Cbr'*, processes for the chevron bone; *Cbr*, chevron bone.



FIG. 2.



Caudal vertebra of *Chelydra*. Letters as in fig. 1.

FIG. 3.



FIG. 4.



Skulls of *Ceratohelyx* (fig. 3) and *Chelydra* (fig. 4); the latter of the natural size, the former much reduced. The portion of the skull of *Chelydra* which corresponds with the fossil is shaded.

FIG. 5.



FIG. 6.



Sectional views of a scute of the tail-armour of *Ceratodus* (fig. 5), and of one of the crest plates of *Gypsocheilus*, both of the natural size.